

REMARKS/ARGUMENTS

Description of amendments

Applicants amended the drawings to overcome the Examiner's objections. Reference numeral 10s was accidentally omitted from Fig. 10f. Applicants have added to Fig. 10f the reference numeral 10s. Figs. 12a-d were amended by adding the legend "Prior Art."

Applicants amended the specification to overcome the Examiner's objections.

Applicants amended claims 36, 37, 38, 40, 42, 43, 44, 45, 46, 47, 48, 49, 51, 52, 55, 58, 61, 62, 71, 72, 73, 80, 81, 82, 83, 89, 90, 91 and 93 to overcome the Examiner's objections and rejections.

Objections to the drawings

The drawings were objected to as failing to comply with 37CFR 1.84(p)(5). Specifically, the Examiner stated that reference numerals 18b, 12b, and 10s were not shown in the drawings.

With respect to reference numerals 18b and 12b, Applicants respectfully draw the Examiner's attention to Figure 1e which shown the reference numerals. Applicants have amended the specification to mention Figure 1e.

With respect to reference numeral 10s, Applicants have amended Figure 10f to add the reference numeral.

The Examiner also stated that Figures 12a-12d should be designated as prior art. Applicants have amended the figures as suggested by the Examiner.

Objections to the specification

The specification was objected to for containing informalities. Applicants have amended the specification to overcome the objections and believe the amendments overcome all objections. The amendments are described as follows:

The title of the application was amended – the words "and method" were deleted due to the claims at hand, and the words "using parallel flow" were added to give a more descriptive title.

All the English mistakes indicated by the Examiner were addressed and corrected.

Page 15, line 27 (now 16 line 5, the lines have changed due to the corrections made) – the words "by using of" were amended to read "using".

Page 20 line 30 – the letter "s" was replaced with "a".

Page 25 line 10 – the word "clean" was amended to "cleaned."

Page 25 line 20 – the word "it" was replaced by "it's".

Page 25 line 23 – the word "reduces" was replaced by "reduced".

Page 25 line 27 – in the phrase "top surface..." the word "is" was added.

Page 26 line 6 – the word "the" was deleted after the word "respect".

Page 29, line 30 – "figure 73" was replaced by "figure 7d".

Page 30; lines 12 and 17 – the word "clean" was replaced by "cleaned".

Page 30, line 14 – the word "not" was replaced with "no".

Page 31, line 5 – the word "response" was replaced by "respond".

Page 33, line 33 – the word "clean" was replaced by "cleaned".

Page 35, line 3 – the word "imposed" was replaced by "imposes".

Page 35 line 20 – the word "that" was deleted.

Page 36, line 26 - the word "imposed" was replaced by "imposes".

Page 39, line 13 – the numeral "3" was replaced with the word "three".

Page 40, line 29 – the word "lateral" was deleted.

Objections to the claims

The objections are believed to be overcome by the claim amendments.

Rejections under 35 U.S.C. §112

Claims 36-99 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. Claims 36-99 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicants believe that the claim amendment overcome the rejections. Some of the claim amendments are described as follows.

The term "miniature lateral scale" refers to the width – the distance between two opposing elongated lips - of the opening of the high-pressure outlet, and is understood when reading the text to be in the orders of tens of microns (see end paragraph in page 17, continuing on page 18). The claims were amended to replace the term "miniature lateral scale" by "width".

"Active surface" – the term has been replaced by the surface on the cleaning head where the high-pressure outlets is/are located.

The claim was amended with the term "surface where said at least one high pressure outlet is located".

The word "narrow" was deleted.

The word "sharp" was replaced by "has a pointed end".

"High-pressure" means pressure that is greater than the ambient pressure.

The word "significantly" was deleted from claims 44, 45.

Claim 55 was cancelled (without prejudice) – the applicant agrees with the examiner that motion combined with linear motion is unnecessary.

Claims 59-60 – the term "cleaning head" was added to claim 36 to provide antecedent basis. The word "unit" has been deleted.

Claim 64 – the term "cleaning head" now has antecedent basis.

Claims 78-79 – "at least two high-pressure outlets" of the same high pressure outlet" mentioned in claim 1. In claim 1 at least one is claimed, in claims 78-79 at least two are claimed.

Claim 80 was amended to claim a situation where there is a plurality of high-pressure outlets and at least one of the is divided into separately operable sectors.

Claim 81, 82, 83 were amended accordingly.

The word" miniature" was deleted from the claims entirely.

Claims 89-90 – the claims were amended by adding the phrase "the relative motion means comprises" to indicate that the mechanical means relate to the relative motion means.

Claim 93 – was amended by adding the phrase: "for heating the gas or the surface of the object to be cleaned".

Rejections under 35 U.S.C. §§ 102 and 103

Claims 36, 42, 46-56, 61, 71-74 and 78 were rejected under 35 U.S.C. §102(b) as being clearly anticipated by Uzawa et al. Claims 36, 50, 65, 70 and 71 were rejected under 35 U.S.C. §102(b) as being clearly anticipated by Sowell et al. Claims 36-38, 50-53, 56, 57, 61, 62, 64, 82-86, 88, 90 and 99 were rejected under 35 U.S.C. §102(a, e) as being clearly anticipated by Hunter et al.

Claims 37, 38, 59, 70, 77, 79 and 80 were rejected under 35 U.S.C. §103(a) as being unpatentable over Uzawa et al. Claims 39-41, 43-45, 65, 66, 68 and 69 were rejected under 35 U.S.C. §103(a) as being unpatentable over Uzawa et al. in view of Chino et al. Claims 58 and 81 are rejected under 35 U.S.C. §103(a) as being unpatentable over Uzawa et al. as applied to claim 36 above, and further in view of Sjöberg. Claims 39-41, 43-45 and 65 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hunter et al. in view of Chino et al. Claim 87 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hunter et al. Claims 93-94 were rejected under 35 U.S.C. §103(a) as being unpatentable over Hunter et al. as applied to claim 83 above, and further in view of Meyer et al. Claim 96 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hunter et al. as applied

to claim 83 above, and further in view of Sjöberg. Claim 97 is rejected under 35 U.S.C. §103(a) as being unpatentable over Hunter et al. as applied to claim 83, and further in view of Zoell. Claim 98 was rejected under 35 U.S.C. §103(a) as being unpatentable over Hunter et al. as applied to claim 83 above, and further in view of Uzawa et al.

Uzawa (US 5,457,847) discloses a dust removing head that employs an "air-knife" (col. 1, line 30). The head has one or more jetting nozzles whose width is not disclosed, operating at 1-2 mm distance from the workpiece, which is not of the same order as the width of the jetting nozzles, thus allowing jets to form. The operating pressure (1200-1800 mmAq, which is typical to air-knife applications, operated by a blower). Furthermore, he uses ultrasonic waves, that are created by the dust removing head. Uzawa's device has jetting nozzles that are inclined with respect to the surface to be cleaned, as this is in the nature of jets to be enhanced when inclined.

Hunter (US Patent Application 10/006,187) discloses different embodiments (to the claimed invention) with different flow regime and different physical removal techniques. Hunter's apparatus includes a showerhead like device that generates a plurality of jets directed toward the substrate (a wafer), where a global (radial) flow regime is developed. This is definitely a different embodiment from the ones disclosed in the present application where the miniature parallel flow is generated along the process area thus it is local (one-dimensional slit cleaning process vs two-dimensional process that "works" on the entire wafer area during the cleaning process).

In addition, the Hunter patent inherently involve (a) plasma and (b) vibrations to (a) weaken the electrical adhesive forces and to (b) enhance removal force where in the claimed invention rapidly accelerated parallel flow is used where peak performance of removal forces are obtain as flow velocity is around sonic-speed, and very close to the elongated cleaning head thus boundary layer is not yet develop.

The Sowel patent (US 5,722,111) is entirely in a different field – it relates to a blower for blowing leaves.

The claimed invention is not an "air-knife" version. The flow from the cleaning head is not in the form of jets, but is a rapidly accelerated flow as seen in Figs 3a-3c,

parallel to the surface to be cleaned. The boundary layer is practically not yet developed in the claimed invention, and therefore there is no need for periodic flow (such as the ultrasonic waves mentioned by Uzawa) to enhance partial removal. Moreover, the scale indicated by Uzawa (1-2 mm) is above the scale needed for the purposes of the claimed invention (30-1000 microns). In addition the pressure used in the claimed invention is in the range of between up to 5 bars (which is 50,000 mmAq and above, as opposed to Uzawa's 1200-1800 mmAq,) and as much as up to 100 bars. The design of the cleaning head of the claimed invention may be inclined too but this is not a necessary feature of the design.

Other references relate to dependent claims and need not be discussed as Applicants believe the independent claims are patentable.

In light of the foregoing remarks, this application is considered to be in condition for allowance, and early passage of this case to issue is respectfully requested. If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-0150.

Respectfully submitted,

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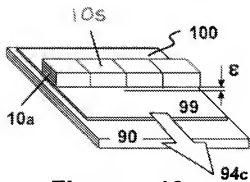


Figure – 10f

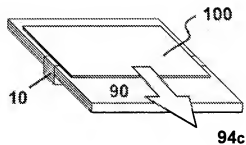


Figure – 10g

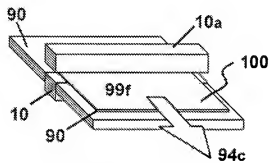


Figure – 10h

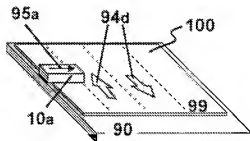


Figure – 10i

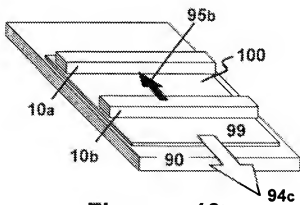


Figure – 10j

